30437
S/109/61/006/012/012/020
D246/D305

9,4330 (1139, 1143, 1161)

AUTHORS: Bonch-Bruyevich, V.L., and Serebrennikov, P.S.

TITLE: On the volt-amp characteristics of tunnel diodes

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 12, 1961, 2041 - 2053

TEXT: Calculations of the volt-amp characteristics are made, assuming complete degeneracy (zero temperature) and with particular attention given to the inhomogeneity of electric field in the junction. Direct transitions and indirect transitions with participation of phonons and impurities are, treated. The negative resistance region is investigated in the first and last cases. The present work was carried out because the authors considered that a satisfactory theoretical treatment had not been carried out previously by themselves and others. In the introduction the following complications are discussed: the narrowness of the p-n junction, the abrupt inhomogeneity of the electric field, localized fluctuations of the field, the energy spectra of heavily doped regions and the

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On the volt-amp characteristics of ...

occurrence of permitted levels in the forbidden gap. The treatment for the inhomogeneous field consists in dividing the junction into sections, sufficiently small for the field in each to be homogeneous, but sufficiently large for the linear dimensions to exceed the lattice constant. The usual theory of tunnel effect is applied to each section and the resultant current is obtained by integration over all sections. The field distribution assumed is $E = E_m\{1 - (x/\ell_1)^\gamma\}$ for $0 \leqslant x \leqslant \ell_1$ and $E = E_m\{1 - (x/-\ell_2)^\gamma\}$ for $-\ell_2 \leqslant x \leqslant 0$ where x is the coordinate direction perpendicular to the junction and $\ell = \ell_1 + \ell_2$ is the length of the junction;

$$E_m = E_{m,0}(1 - \varphi/U_k)^{\frac{\gamma}{\gamma+1}},$$

where $E_{m,0}$ and γ ($\geqslant 0$) are parameters estimated from the dependence of the junction capacitance upon applied voltage φ, and U_k is the contact potential difference between n - and p-type material.

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On the volt-amp characteristics of ...

Direct transitions (with assumptions applicable to germanium): The calculation was carried out for the isotropic approximation of scalar effective masses of electrons m_n and holes m_p and with the assumption $\Delta_p > \Delta_n$, where Δ_p and Δ_p are the energy differences between the Fermi level and the bottom of the conduction band and the top of the valence band, respectively. In conclusion, attention is drawn to the similarity of the formulas obtained for the three different mechanisms of transition, to the validity of the formal procedure of calculations based on homogeneous field theory, assuming everywhere $\gamma \longrightarrow \omega$, and to the paramount importance of alloying conditions in determining Δ_n and Δ_p upon which all calculated quantities and functional relations depend. Acknowledgement is made to S.G. Kalashnikov for discussion and to M. Leks for a preprint of this work. There are 1 figure and 13 references: 7 Soviet-bloc and 6 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: R.C. Klauder, Phys. Rev. (in print), E.O. Kane, J. Appl. Phys., 1961, 32, 1, 83; Nick Holonyak, jr., J. Appl. Phys., 1961, 32, 2, 130; E.O. Kane, Phys.

Card 3/4

30437
S/109/61/006/012/012/020
D246/D305

On the volt-amp characteristics of ...

chem. Sol., 1960, 12, 2, 181.

SUBMITTED: July 11, 1961

4

Card 4/4

TYABLIKOV, S.V.; BONCH-BRUYEVICH, V.L.; ORLOVA, I.A., red.; POPOVA, N.S., tekhn. red.

[Perturbation theory for double-timed thermal Green's functions] Teoriia vozmushchenii dlia dvukhvremennykh temperaturnykh funktsii Grina. Moskva, Izd-vo Mosk. gos. univ. 1962. 65 p. (MIRA 16:8)
(Perturbation) (Green's functions)

MARTIN, P.[Martin, Paul]; SHVINGER, Yu.[Schwinger, Julian]; MOSKALENKO, V.A.[translator]; KASIYAN, A.I.[translator]; BONCH-BRUYEVICH, V.L.[translator]; ZHABOTINSKIY, Ye.Ye., red.; DUDAYEVA, G.M., tekhn. red.

[Theory of many-particle systems. Brownian motion of a quantum oscillator] Teoriia sistem mnogikh chastits. Brounovskoe dvizhenie kvantovogo ostsilliatora [By] Julian Schwinger. Moskva, Izd-vo inostr. lit-ry, 1962. 167 p. (MIRA 15:12)
(Quantum field theory) (Potential, Theory of)

33372
S/181/62/004/001/050/05-
B112/B138

24.3500(1137,1138,1144)

AUTHOR: V. L. Bonch-Bruyevich

TITLE: Theory of optical transitions in semiconductors

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 298 - 299

TEXT: The theoretical value

$$\sigma \simeq \frac{e^2 f}{\hbar c \sqrt{\varepsilon}} \frac{(\Delta - E_a)^2 \sqrt{kT}}{m_o c^2 E_a^{3/2}} \frac{\Delta}{E_e(p_o) - E_v(p_o)} \frac{\hbar^2}{mkT}$$

of the mean cross-section of electron capture in a Si-type semiconductor was found to be higher than the experimental one for the case $\varepsilon = 12$, $\Delta = 1.12$ ev, $E_a = 0.16$ ev, $m_l = 0.97\ m_o$, $m_t = 0.19\ m_o$ (f is the oscillator power, ε the optical permittivity, m_o the free electron mass, $m = 1/(2m_t^{-1} + m_l^{-1})$ the effective mass in the conduction band, Δ the forbidden band width). This fact is attributed to the influence of the emissional capture

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Theory of optical transitions...

mechanism in the given case. Ya. Ye. Pokrovskiy and K. I. Svistunova (FTT, 3, 9, 1961) are referred to. There are 5 references: 4 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: D. M. Eagles. J. Phys. Chem. Sol., 16, 76, 1960.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 19, 1961 (initially), September 21, 1961 (after revision)

Card 2/2

S/181/62/004/002/001/051
B102/B138

AUTHORS: Bonch-Bruyevich, V. L., and Suris, R. A.

TITLE: Some peculiarities of current carriers in ferromagnetics

PERIODICAL: Fizika tverdogo tela, v. 4, no. 2, 1962, 309-316

TEXT: The energy spectrum of the carriers in ferromagnetics is studied theoretically without any model assumptions. In particular, the interacting electrons are not divided into magnetic and conduction ones, no individual s- and d-type wave functions are introduced and spontaneous magnetization is considered semiphenomenological. The carriers are taken to be quasiparticles of equal charge, characterized by their quasimomentum and unit charge. The physical content of a multi-electron system depends on the case considered. The energy spectrum of the carriers is determined by the singularities of the single-fermion Green function, G, electron interaction is described by a quantized Bose field, characterized by the electromagnetic Green function D

Card 1/7

$$\left\{\sum_{k=0,1,2,3} c\gamma^k\left(-p_k+\frac{e}{c}A_k\right)-mc^2-M\right\}G=-1, \quad (1)$$

$$(\Box-P)D=1. \quad (2)$$

p_k are the components of the four-momentum operator, γ^k - Dirac matrices, e - electron charge, A_k - components of four-potential:

$$\Box A_k=\frac{1}{c}g^{kk}(j^k+J^k),\ g^{00}=-g^{11}=-g^{22}=-g^{33}=1,\ g^{ik}=0\ (i\neq k), \quad (3)$$

The electrons are assumed to be in the non-quantized lattice field. $J^k(x)$ is the density of the "classical" external current of the periodic field, $j^k(x)$ = iec Spur $\gamma^k \lim_{\substack{x\to x' \\ x^{0\prime}>x^0}} G(x,x')$ is the electron current density.

Mass and polarization operators are given by

$$M = -ie^2 \sum_{k,l} \gamma^k G \Gamma^l D_{kl},$$

$$P_k^m = ie^2 g^{kk} \mathrm{Spur}\, \gamma^k G \Gamma^m G,$$

where $\Gamma^l = -\frac{\delta G^{-1}}{\delta e A^l}$ is the total vertex part. Under these assumptions,

$$\mathcal{H} = e\varphi + e\varphi_1 + \sigma\varphi_2 - \mu +$$
$$+ \frac{1}{2m}\left\{\left(\sigma,\ \mathbf{p} - \frac{e}{c}\mathbf{A} - \frac{e}{c}\mathbf{A}_1 - \frac{l}{c}\mathbf{A}_2\right) - \frac{1}{c}\varphi_3\right\} \times$$
$$\times \left\{\left(\sigma,\ \mathbf{p} - \frac{e}{c}\mathbf{A}^* - \frac{e}{c}\mathbf{A}_1^* - \frac{e}{c}\mathbf{A}_2^*\right) - \frac{1}{c}\varphi_3^*\right\}. \qquad (12)$$

is derived for the effective Hamiltonian of the system, with

$$\varphi_1(x)=\frac{1}{2e}\,\mathrm{Sp}\int dz M_{11}\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)e^{ip_0 z}, \tag{13а}$$

$$\varphi_2(x)=\frac{1}{2}\,\mathrm{Sp}\,\sigma\int dz M_{11}\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)e^{ip_0 z}, \tag{13б}$$

$$\varphi_3(x)=\frac{1}{2}\,\mathrm{Sp}\int dz M_{12}\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)e^{ip_0 z}, \tag{13в}$$

$$\mathbf{A}_1(x)=-\frac{1}{4e}\,\mathrm{Spur}\int dz\gamma M\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)e^{ip_0 z}, \tag{13г}$$

$$\mathbf{A}_2(x)=-\frac{1}{2e}\,\mathrm{Sp}\,\sigma\int dz M_{12}\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)e^{ip_0 z}. \tag{13д}$$

It holds, if

$$(M\psi)_x=\left[\int dz M\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)e^{ip_0 z}+\right.$$
$$+\int dz\left\{M\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)\left(-ip_0+\frac{\partial}{\partial x}\right)+\left(-ip_0+\frac{\partial}{\partial x}\right)\times\right.$$
$$\left.\left.\times M\left(x-\frac{z}{2},\ x+\frac{z}{2}\right)\right\}ze^{ip_0 z}+\ldots\right]\psi(x). \tag{11}$$

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where ψ is the single-particle wave function

$$\left\{\sum_k c\gamma^k\left(-p_k+\frac{e}{c}A_k\right)-mc^2-M\right\}\psi=0. \qquad (4)$$

and $M(x,y) = \delta(x^0-y^0)M(\vec{x},\vec{y})$, $M_k = \frac{1}{4}\varepsilon^{kk}\,\mathrm{Spur}\,\gamma^k M$; $\widetilde{M} = M - \sum_k \gamma^k M_k$, $\psi = \begin{pmatrix}\psi_1\\ \psi_2\end{pmatrix}$, $M' = \gamma^0\widetilde{M} = \begin{pmatrix}M_{11} & M_{12}\\ M_{21} & M_{22}\end{pmatrix}$. ψ_1 and ψ_2 are two-component spinors; $\psi_2 = \frac{1}{2mc}(\vec{\sigma}\vec{\pi} + M_{21}/c)\psi_1$, $\pi_\alpha = p_\alpha - \frac{e}{c}A_\alpha$; $\mathcal{H} = A + \frac{1}{2m}BB^*$, $A = e\varphi + M_{11} - \mu$, $B = \vec{\sigma}\vec{\pi} + M_{12}/c$; φ - scalar potential. Spur denotes the spatial trace of a fourth-rank matrix, Sp the trace with respect to spin indices. In the following, the effective magnetic field is determined for a cubic lattice ($D_{kl}(x_1,x_2) = \varepsilon_{kl}D(x_1,x_2)$), with the effective Hamiltonian

$$\mathcal{H} = e(\varphi+\varphi_1) - \mu + \frac{1}{2m}\left(\mathbf{p} - \frac{e}{c}\mathbf{A} - \frac{e}{c}\mathbf{A}_1\right)^2 + \beta_0(\sigma,\ \mathbf{H}+\mathbf{H}_1+\varphi_2), \qquad (17)$$

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β_0 - Bohr's magneton, $\vec{H} = \operatorname{curl} \vec{A}$, $\vec{H}_1 = \operatorname{curl} \vec{A}_1$,

$$\varphi_1(\mathbf{x}) = -\frac{1}{2}\int d\mathbf{z}d\mathbf{x}_1 e^{i\mathbf{p}\mathbf{z}} e\rho\left(\mathbf{x}_1, \mathbf{x}-\frac{\mathbf{z}}{2}\right) f\left(\mathbf{x}_1, \mathbf{x}+\frac{\mathbf{z}}{2}; \mathbf{y}\right) D\left(\mathbf{y}, \mathbf{x}-\frac{\mathbf{z}}{2}\right), \quad (18)$$

$$\varphi_2(\mathbf{x}) = -\frac{c^2}{2\beta_0}\int d\mathbf{z}d\mathbf{x}_1 e^{i\mathbf{p}\mathbf{z}} \mathbf{S}\left(\mathbf{x}_1, \mathbf{x}-\frac{\mathbf{z}}{2}\right) f\left(\mathbf{x}_1, \mathbf{x}+\frac{\mathbf{z}}{2}; \mathbf{y}\right) D\left(\mathbf{y}, \mathbf{x}-\frac{\mathbf{z}}{2}\right). \quad (19)$$

$$\mathbf{A}_1(\mathbf{x}) = -\frac{1}{2c}\int d\mathbf{z}d\mathbf{x}_1 e^{i\mathbf{p}\mathbf{z}} \mathbf{j}\left(\mathbf{x}_1, \mathbf{x}-\frac{\mathbf{z}}{2}\right) f\left(\mathbf{x}_1, \mathbf{x}+\frac{\mathbf{z}}{2}; \mathbf{y}\right) D\left(\mathbf{y}, \mathbf{x}-\frac{\mathbf{z}}{2}\right), \quad (20)$$

$\varrho(\vec{x}_1, \vec{x}_2)$ and $\vec{S}(\vec{x}_1, \vec{x}_2)$ are particle density matrix and matrix of spin magnetic moment, $\vec{j}(\vec{x}_1, \vec{x}_2)$ is the current density matrix. The effective fields determined by $\vec{A}_1$ and $\vec{\varphi}_2$ due to particle interactions and acting upon the carriers are then only nonvanishing if the electron system has an own magnetic structure or if it is located in an external field. $\vec{A}$, $\vec{A}_1$, φ_1, φ_2 are strongly temperature dependent. If $\vec{H}_S = \operatorname{curl} \vec{A}_S$,

$$H_{S,\alpha}(\mathbf{x}) = 4\pi S_\alpha(\mathbf{x}) + \int G_{\alpha\beta}(\mathbf{x}, \mathbf{x}') S_\beta(\mathbf{x}')\, d\mathbf{x}', \quad (22)$$

where $G_{\alpha\beta}$ is the proper Green function, satisfying

$$\nabla_x^2 G_{\alpha\beta}(x, x') = -4\pi \frac{\partial^2}{\partial x_\alpha \partial x_\beta} \delta(\mathbf{x} - \mathbf{x}') \qquad (23)$$

L. E. Gurevich is thanked for discoussions. There are 6 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: July 3, 1961

Card 7/7

S/181/62/004/002/054/051
B102/B138

24.7700 (1035, 1043, 1055, 1137)

AUTHORS: Bonch-Bruyevich, V. L., and Glasko, V. B.

TITLE: Theory of "cascade" recombination of carriers in homopolar semiconductors

PERIODICAL: Fizika tverdogo tela, v. 4, no. 2, 1962, 510-523

TEXT: Some problems are investigated which are related to the cascade mechanism of carrier trapping by impurity centers, and the conditions for the occurrence of this mechanism are determined. The spectra of the excited states of neutral and charged traps are calculated. In the latter case the screening effects are also taken into account. Calculations are made for an isotropic model within the framework of the effective-mass method. The Schrödinger equation

$-\frac{\hbar^2}{2m}\nabla^2\psi + V(r)\psi = (-W)\psi$, where $V(r) = -\frac{\alpha e^2}{2\varepsilon^2 r^4} = \text{const}$, α - polarizability of the center, ε - dielectric constant, m - effective mass, is considered first. With the characteristic units of length and energy

Card 1/

$= \sqrt{\frac{ame^2}{\hbar^2}}$, and $W_0 = \frac{\hbar^2}{2m}$, the dimensionless quantities $x = \frac{r}{}$, $= \frac{W}{W_0}$ are introduced and $\varphi = Y_l^m(\theta,)\frac{u(x)}{x}$ is obtained. Y_l^m is a spherical function of the polar angles θ and φ and $u(x)$ is the solution of

$$L[u] \equiv u'' + \left\{V(x) - \frac{l(l+1)}{x^2}\right\} u = \lambda u \qquad V(x) = \begin{cases} \frac{1}{x^4}, & x \geqslant x_0, \\ V_0 \equiv \frac{1}{x_0^4}, & x \leqslant x_0, \end{cases} \qquad (7)$$

$$(u(0) = 0, \quad u(\infty) = 0).$$

$l = 0, 1, 2, \ldots$ $x_0 = r_0/$. For $, 0$, (7) is solvable if zeros exist of $L[u] - u = 0$, $u(0) = 0$, (8). If no zeros exist, it is not solvable.. For $x_c = \frac{1}{\mu_1^{1/2}\, l(l+1)^{1/4}}$ the first root of $u(x,) = C\ x\ J_{l+\frac{1}{2}}(x\ V_0 -)$ for $=0$, continued into the interval $x\ x_0$, coincides with the second inflection point of the exact solution of (8). The eigenvalues for each

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l and the number of roots of (8) are determined and tabulated. For λ,

$$\lambda \simeq \left(\frac{x_0^{-1} - \frac{1}{2}\pi n}{0.4} \right)^4; \qquad (23)$$

$l \neq 0$

$$\lambda \simeq 4 \frac{2x_0^{-1}\sqrt{1-x_0^2L^2} - L\left(\frac{\pi}{2} + \operatorname{arc\,tg}\frac{\sqrt{1-x_0^2L^2}}{x_0L} - \operatorname{arc\,sin} x_0L\right) - n\pi}{2x_0^3\sqrt{1-x_0^2L^2} + x_0L^{-2} + L^{-3}\left(\frac{\pi}{2} - \operatorname{arc\,sin} x_0L\right)}. \qquad (24)$$

are obtained; L = $\sqrt{l(l+1)}$, n is an integral number. The results are used to study the possibility of cascade trapping of carriers in a deep neutral trap. a and x_0 are taken as characteristic parameters of the problem. The calculations are carried out for germanium and silicon:
Germanium:
$\varepsilon = 16$, $J_0 \equiv \frac{me^4}{2\hbar^2\varepsilon^2} = 0.01$ev, $W_1 = 0.22$ ev;

Card 3/[illegible]

$$\left.\begin{aligned} \gamma &= 1.89\ \text{Å}, \quad W_0 = 4.05\ \text{эв}, \quad \lambda_1 = 5.4\cdot 10^{-2}, \\ x_0 &= 0.77, \quad r_0 = 1.5\ \text{Å}, \quad N(x_0) = 1 \div 2. \end{aligned}\right\} \qquad (27),$$

or $r_0 = 3.2\cdot 10^{-7}$ cm, $\gamma = 1.6\cdot 10^{-6}$ cm, $\alpha = 3.2\cdot 10^{-16}$ cm^3.

Silicon: $\varepsilon = 12$, $J_0 = 0.04$ ev, $W_1 = 0.5$ ev;

$$\left.\begin{aligned} \gamma &= 1.67\ \text{Å}, \quad W_0 = 3.28\ \text{эв}, \quad \lambda_1 = 0.152, \\ x_0 &= 0.73, \quad r_0 = 1.21\ \text{Å}, \quad N(x_0) = 1 \div 2. \end{aligned}\right\} \qquad (28),$$

or $r_0 = 1.9\cdot 10^{-7}$ cm, $\gamma = 0.8\cdot 10^{-6}$ cm, $\alpha = 1.6\cdot 10^{-8}$ cm.

For charged traps in non-degenerate semiconductors,

$$V(r) = -\frac{e^2}{\varepsilon r} e^{-\beta r}, \quad \beta^{-1} = \left(\frac{\varepsilon kT}{4\pi n e^2}\right)^{1/2}. \qquad (29)$$

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where β^{-1} is the Debye radius and n is the concentration of the screening carriers. With

$$x=\beta r,\ \lambda=\frac{2mW}{\hbar^2\beta^2},\ g^2=\frac{2}{\beta a_0},\ a_0=\frac{\varepsilon\hbar^2}{me^2}, \quad (30),$$

the effective wave function

$$\left.\begin{aligned}\psi(r)&=Y_l^m(\theta,\varphi)\frac{u(x)}{x},\\ u''-\frac{l(l+1)}{x^2}u+g^2\frac{e^{-x}}{x}u&=\lambda u.\end{aligned}\right\} \quad (31)$$

is obtained, for which the total number of excited levels is estimated quasiclassically:

$$(0)=\left(\frac{2}{3}\right)^{5/2}\frac{\xi^3}{2\sqrt{\pi}}\simeq 10\left(\frac{T^{\circ}K}{300}\frac{10^{16}}{n\ cm^{-3}}\right)^{3/4}\left(\frac{I_0 ev}{10^{-2}}\right)^{3/2}\left(\frac{1}{16}\right)^{9/4} \quad (33) \text{ is obtained}$$

Card 5/0 6

for the s-states. $I_o = \frac{me^4}{2\hbar^2\varepsilon^2}$ is the characteristic energy of the material.

The numerical results for Ge and Si are given in Tables 6 and 7. There are 1 figure, 7 tables, and 15 references: 11 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: M. Lax. Phys. Chem, Sol. 8, 66, 1959; Phys. Rev, 119, 1502, 1960; W. W. Tyler et al. Phys. Rev. 98, 461, 1955; L. Hulthén, K. Laurikainen. Rev. Mod. Phys. 23, 1, 1951; J. A. Burton et al. J. Phys. Chem., 57, 853, 1953.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 4, 1961

Table 6. Total number of quasiclassical levels for Ge ($n=10^{16}cm^{-3}$).

Table 7. Total number of quasiclassical levels for Si.

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S/181/62/004/010/004/063
B108/B186

AUTHOR: Bonch-Bruyevich, V. L.

TITLE: On the theory of highly alloyed semiconductors

PERIODICAL: Fizika tverdogo tela, v. 4, no. 10, 1962, 2660-2674

TEXT: To study the effect of impurities on the spectrum of the free carriers in a semiconductor, the author calculated the density of states, $\rho(E)$, for highly doped semiconductors by solving the corresponding dynamical problem. The Fermi level is slightly lower than that for an ideal gas as can be seen from an expansion with respect to the small parameter $\lambda = (na_0^3)^{-1/2}$. n is the impurity concentration, a_0 is Bohr's radius in the crystal. The role of the Coulomb interaction between the electrons affects the position of the Fermi level more than the role of the impurities. A detailed study of the density of states accounting for Coulomb interaction showed that $\rho(E)$ differs from zero in the forbidden band but vanishes asymptotically with increasing distance from the bottom of the conduction band. Near the Fermi level it is nearly the same as

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that of an ideal Fermi gas. The nonvanishing density of states in the forbidden band may lead to some fine effects associated with, e. g., the excess current in a tunnel diode (Radiotekhn. i elektron., 5, 2033, 1960) and the frequency dependence of the characteristic absorption of light near the red edge.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: February 19, 1962 (initially)
April 17, 1962 (after revision)

S/020/62/147/005/011/032
B112/B102

AUTHOR: Bonch-Bruyevich, V. L.

TITLE: Spectral representation of mass and polarization operators at any temperature

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 5, 1962, 1049-1052

TEXT: The mass operator of a one-fermion system is defined by

$$M(E) = G^{-1}(E) - G_0^{-1}(E), \quad (1)$$

$$G_0^{-1}(E) = 2\pi(W - E); \quad (2)$$

where

$$G(E) = \frac{1}{2\pi_i}\int_{-\infty}^{+\infty} dE' \frac{I_+(E')}{E' - E}, \quad (3)$$

W(p) denotes the unperturbed energy of a single particle, and the spectral function $I_+(E')$ has the properties

$$I_+(E') \in \mathrm{Re}; \quad I_+(E') \geq 0, \quad \int_{-\infty}^{+\infty} dE' I_+(E') = 1. \quad (4)$$

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Ca: Card 1/3

(16a)

Spectral representation of mass...

and a phonon part

$$D_{0,\text{фон}}^{-1} = -(2\pi)^4 \frac{\omega^2(p) - E^2}{p^2}. \qquad (16b)$$

The singularities of P(E) are found to be distributed along the real axis symmetrically with respect to the coordinate origin. The spectral representation of P(E) is similar to that of M(E).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: July 3, 1962, by N. N. Bogolyubov, Academician

SUBMITTED: June 28, 1962

L 18028-63 EWT(1)/EWG(k)/BDS AFFTC/ASD/ESD-3/IJP(C) Pz-4

AT

ACCESSION NR: AP3003880 S/0181/63/005/007/1852/1864

62

60

AUTHOR: Bonch-Bruyevich, V. L.

TITLE: Theory of strongly alloyed semiconductors

SOURCE: Fizika tverdogo tela, v. 5, no. 7, 1963, 1852-1864

TOPIC TAGS: semiconductor, alloy, Fermi distribution, conduction band, valence band, forbidden band, current carrier, impurity

ABSTRACT: This is a continuation of the author's previous work (FTT, 4, 2660, 1962). Here he has examined the simplest model: two bands with spherical surfaces of constant energy separated by a forbidden zone. He has assumed that the width of this forbidden zone is considerably smaller than the distance from the extremities of the given bands to any remaining bands. Results indicate that the concept of a forbidden zone is conditional. Strictly speaking, the density state in the "forbidden" zone differs from zero (a "tail") when the effective forces of attraction act quickly between impurities and current carriers. Compensation decreases the density state in the "tail," bringing it practically to zero at full

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ACCESSION NR: AP3003880

compensation. Impurities, repelling carriers, do not form a "tail" (when there is no "interaction" between bands). The damping of single-particle excitation (current carriers) associated with scattering at infinitely heavy impurity atoms does not generally revert to zero anywhere. The author concludes that the formation of a "tail" is due not to strong attraction between an electron and one specific impurity atom, but to the combined effect of many such atoms rather close together. Further, although the fact that a "tail" exists is beyond doubt, the precise asymptotic form of the function governing the density state has not yet been solved with sufficient reliability. Orig. art. has: 37 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 04Feb63 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 006 OTHER: 002

Card 2/2

L 19582-63 EWT(1)/EWG(k)/BDS AFFTC/ASD/ESD-3/IJP(C) Pz-4 AT
ACCESSION NR: AP3007522 S/0181/63/005/009/2714/2717

AUTHOR: Bonch-Bruyevich, V. L.

TITLE: Some properties of semiconductors with narrow forbidden bands

SOURCE: Fizika tverdogo tela, v. 5, no. 9, 1963, 2714-2717

TOPIC TAGS: mercury telluride phonon transition, mercury telluride forbidden band, mercury telluride phonon life, semiconductor forbidden band, forbidden band, mercury telluride phonon, mercury telluride

ABSTRACT: An attempt is made to determine analytically the probability order of single phonon band-to-band transitions and direct recombinations in HgTe and similar substances in which the forbidden bandwidth is less than the limiting energy of some lattice phonons. Proceeding from the standard interaction Hamiltonian and the law of conservation of energy, it is concluded that, at a bandwidth of about 0.02 ev, mainly short-wave acoustic phonons with wavelengths of about 10^{-7} cm can participate in the process of recombination, while the extremes of the conduction and valence bands

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L 19582-63
ACCESSION NR: AP3007522

must be located in different points of the Brillouin zone. Longer wavelengths can occur only for certain limit-frequency optical phonons with the band extremes close together. Simplified approximations are presented for the transition probability from a quasi-pulse condition in the conduction band to the valence band, and a formula is deduced for the total transition from the conduction band. A formula for phonon lifetime at a low injection level as a function of equilibrium concentrations of conduction electrons and holes is given and, with some approximations, is applied for acoustical and polarization phonons. Orig. art. has: 9 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 28Apr63 DATE ACQ: 140ct63 ENCL: 00

SUB CODE: PH NO REF SOV: 000 OTHER: 000

Card 2/2

L 19018-63 BDS/EWT(1)/FCC(w) AFFTC/ASD/IJP(C)

ACCESSION NR: AP3007523 S/0181/63/005/009/2717/2719

AUTHOR: Bonch-Bruyevich, V. L.; Sokolova, E. B. 55 54

TITLE: On one possible recombination mechanism

SOURCE: Fizika tverdogo tela, v. 5, no. 9, 1963, 2717-2719

TOPIC TAGS: recombination mechanism, exciton capture, localized exciton state, semiconductor theory, negatively charged capture center, electron capture mechanism

ABSTRACT: The results of experiments performed in the last few years on recombination at multicharged centers showed that the cross sections of electron capture by negatively charged centers are unexpectedly large. This led to the conclusion that it is not the electron that is captured but a neutral product, an exciton. In the first stage of such a capture, an electron and a hole produce an exciton. If there is an impurity, the second stage consists in the capture of the exciton and its transition to a localized state associated with the impurity. The concept of such localized states was introduced by various authors, and they were observed experimentally.

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L 19018-63

ACCESSION NR: AP3007523

A simple analytical expression is derived to deduce the behavior modes of localized excitons which might be verified experimentally. It was found that a nonmonotonous temperature dependence, for which there is no physical basis, must be ascribed both to the probability of exciton decay and to the probability of exciton release from the trap per unit time. Furthermore, the dependence of the lifetime on the concentration of basic carriers, resulting from the formula, does not agree with experimental results. Thus, the theoretical formulation of a recombination mechanism based on intermediate excitons does not satisfy the experiments. In principle, however, such a mechanism is not impossible and should be taken into consideration during interpretation of experiments. Orig. art. has: 2 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 28Apr63 DATE ACQ: 140ct63 ENCL: 00

SUB CODE: PH NO REF SOV: 011 OTHER: 003

Card 2/2

L 10245-63 EWT(1)/BDS--AFFTC/ASD
ACCESSION NR: AP3000998 S/0109/63/008/006/1002/1008

51

AUTHOR: Bonch-Bruyevich, V. L.; Serebrennikov, P. S.

TITLE: Current-voltage characteristic of tunnel diode. Case of arbitrary temperatures

SOURCE: Radiotekhnika i elektronika, v. 8, no. 6, 1963, 1002-1008

TOPIC TAGS: tunnel diode theory

ABSTRACT: Formulas are developed that describe the current-voltage characteristic of a tunnel diode and allow for a nonuniform field in the junction. The tunnel current associated with indirect junctions is considered; the formulas describe the simplest case when electrons are scattered by charged impurities. Extremum points and negative resistance are analyzed for various impurity-content cases. Orig. art. has: 1 figure and 31 formulas.

ASSOCIATION: none

SUBMITTED: 07Jun62 DATE ACQD: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 003 OTHER: 000

Card 1/1

BONCH-BRUYEVICH, V.L.; KOZMAN, R.

Theory of heavily alloyed semiconductors; band-to-band transitions. Fiz. tver. tela 5 no.10:2890-2901 O 63. (MIRA 16:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova i Vsesoyuznyy institut nauchnoy i tekhnicheskoy informatsii Gosudarstvennogo komiteta Soveta Ministrov SSSR po koordinatsii nauchno-issledovatel'skikh rabot i AN SSSR.

L 18393-63 EWT(1)/EWG(k)/EDS/ES(w)-2 AFFTC/ASD/ESD-3/IJP(C)/SSD/AFWL
Pi-4/Po-4/Pab-4/Pz-4 AT
ACCESSION NR: AP3003718 S/0109/63/008/007/1179/1186

AUTHOR: Bonch-Bruyevich, V. L.; Gulyayev, Yu. V.

TITLE: Mechanism of generating plasma oscillations in a semiconductor

SOURCE: Radiotekhnika i elektronika, v. 8, no. 7, 1963, 1179-1186

TOPIC TAGS: plasma oscillation, semiconductor

ABSTRACT: Transformation of energy supplied to a semiconductor into plasma-oscillation energy was investigated by D. Pines and J. R. Schrieffer (Phys. Rev., 1961, 124, 5, 1387). The present article deals with the subject on a wider scale; it considers theoretically all possible types of oscillations with an allowance for recombination of carriers. Bipolar-plasma waves in an isotropic homeopolar semiconductor are generated by a stream of electrons. The hydrodynamic approximation is used in setting up the initial differential equations describing concentrations and average velocities. Both types of plasma oscillations,

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L 18393-63
ACCESSION NR: AP3003718

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"optical" and "acoustical," are dealt with. Conditions of excitation of oscillations are examined, and the critical drift velocity ($10^5 - 10^6$ cm/sec) is found. Effective mass of donors is determined. It is inferred that: (1) generation of low-frequency plasma oscillations is easily realizable; (2) the possibility of generating high-frequency oscillations is not clear. "The work was resumed on the initiative of S. G. Kalashnikov to whom the authors are greatly indebted for his support and discussing the results and the possibility of experimental verification. The authors are thankful to M. Ye. Gertsenshteyn and V. I. Pustovoyt for their permission to read their work before its publication." Orig. art. has: 33 formulas.

ASSOCIATION: none

SUBMITTED: 26Jun62 DATE ACQ: 02Aug63 ENCL: 00

SUB CODE: GE NO REF SOV: 006 OTHER: 003

Card 2/2

S/051/63/014/004/008/026
B039/B420

AUTHORS: Bonch-Bruyevich, V.L., Glasko, V.B.

TITLE: Energy levels in a Debye field

PERIODICAL: Optika i spektroskopiya, v.14, no.4, 1963, 495-504

TEXT: A numerical solution of the problem of the energy spectrum of particles in a field with a potential

$$V(r) = -\frac{q^2}{r}\exp\left(-\frac{r}{r_0}\right)$$

is given (r - the distance between centers of force and attracted particles, r_0 - the screening radius). The number and position of the eigenvalues of the energy depending on the character of the parameter

$$g = 2\frac{r_0 m r^2}{h^2}$$

are determined (m - the mass of the particles). The range of g investigated covers the whole range of temperature and concentration which is of interest and the calculated energy levels are fully tabulated. The transition probability with change of l (principal quantum number $N = n + l + 1$) is also estimated. For g = 10, which is typical for semiconductors,

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Energy levels in a Debye field

the transition frequency $\omega = 1.6 \times 10^{-2} W_B$ where $W_B = \frac{mq^4}{2\hbar^2}$

An expression for the transition probability p is also obtained

$$p \sim 3 \times 10^{-4} \left(\frac{q^2}{\hbar c}\right)^3 \frac{\varkappa^2 W_B}{h} \qquad (17)$$

where c - the velocity of light in vacuo, $\varkappa$ - the refractive index. For $\varkappa = 4$ and $W_B = 0.01$ eV

$$p \sim 1.5 \times 10^6 \text{ sec}^{-1}$$

There are 4 figures and 3 tables.

SUBMITTED: July 7, 1962

Card 2/2

BONCH-BRUYEVICH, V. L.

V. L. Bonch-Bruyevich, "Heavily-Doped Semiconductors."

report submitted for the Conference on Solid State Theory, held in Moscow, December 2-12, 1963, sponsored by the Soviet Academy of Sciences.

BONCH-BRUYEVICH, V. L., doktor fiz.-matem. nauk

At the Council on the Problem of "Solid State Physics." Vest. AN SSSR 33 no.1:109 Ja '63. (MIRA 16:1)

(Solids) (Physics—Congresses)

ACCESSION NR: AP4041707 S/0181/64/006/007/2047/2052

AUTHOR: Bonch-Bruyevich, V. L.

TITLE: Concerning recombination of hot electrons

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2047-2052

TOPIC TAGS: differential resistance, energy distribution, electron capture, electron recombination, capture cross section, distribution function, impurity center

ABSTRACT: Using the same formulation of the problem and approximations as in an earlier paper (FTT, Sbornik statey, v. 1, p. 182, 1959) but different electron distribution functions, the author calculates the field dependence of the coefficient of capture of hot electrons by impurity centers in the presence of a Coulomb barrier. The case of relatively weak fields ($< 10^3$ V/cm) is considered, in order to remain within the framework of quasi-classical

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ACCESSION NR: AP4041707

theory, when the carrier energy distribution function is given by the Davy*dov formula (ZhETF v. 7, 1069, 1937). The current-voltage characteristic of an impurity specimen is calculated with account of the dependence of the capture cross sections on the field intensity. Under certain conditions the characteristic has a region with negative differential resistance. To obtain negative resistance, the lattice temperature must be low. "The author is grateful to S. G. Kalashnikov for numerous discussions of the results. Orig. art. has: 25 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 28Jan64 ENCL: 00

SUB CODE: NP NR REF SOV: 004 OTHER: 006

Card 2/2

ACCESSION NR: AP4043390 S/0181/64/006/008/2535/2537

AUTHORS: Bonch-Bruyevich, V. L.; Rozman, R.

TITLE: On the theory of light absorption in strongly doped semiconductors

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2535-2537

TOPIC TAGS: light absorption, doping, forbidden band, band width, germanium, electron concentration

ABSTRACT: Inasmuch as earlier interpretations of experimental data on light absorption in strongly doped semiconductors are based on the concept of the width of the forbidden band, which is not amenable to an unambiguous definition, the authors introduce a "renormalized" expression for the bandwidth, whereby the "narrowing down of the forbidden band" becomes simply due to the exchange interaction between the carriers, and has no direct bearing on the influ-

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ACCESSION NR: AP4043390

ence of the impurity on the band structure of the semiconductor, which is practically negligible. The correctness of this interpretation is checked for n-type germanium. It is indicated that it is also possible to check this interpretation experimentally by producing a high electron concentration not by doping but with the aid of injection. However, the required level of injection is too large for the present experimental capabilities. Orig. art. has: 5 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 16Mar64 ENCL: 00

SUB CODE: SS NR REF SOV: 006 OTHER: 005

Card 2/2

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000206210011-8"

L 18941-65 EWT(1) IJP(c)

ACCESSION NR: AP5001195 S/0041/64/016/006/0719/0729

AUTHOR: Ponch-Bruyevich, V. L. (Moscow)

TITLE: Effective wave equations in the theory of quantum Green functions

SOURCE: Ukrainskiy matematicheskiy zhurnal, v. 16, no. 6, 1964, 719-729

TOPIC TAGS: effective wave equation, quantum Green function, first density matrix, average density, Green function bilinear expansion, binary correlation function

ABSTRACT: Nonhomogeneous equations for the temperature quantum Green functions which depend on two time arguments (there may be other arguments, too) are analyzed in connection with the corresponding homogenous problem defined by the effective wave equations. Conditions are presented under which bilinear expansions of Green functions in eigenfunctions of the effective wave equations are possible. Such expansions are derived for two important causal Green functions G_c (single-fermion Green function) and G_{2c} (two-fermion Green function). It is pointed out that similar expansions can be derived for Green functions with deviating arguments. Using the same method of Green functions, expressions for the average energy, the thermodynamic potential, the first density matrix, and the binary correlation function of many interacting particles are derived in terms of eigenvalues and eigen-

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L 18941-65
ACCESSION NR: AP5001195

functions of the homogeneous problem. Orig. art. has: 43 formulas.

ASSOCIATION: none

SUBMITTED: 02Feb60 ENCL: 00 SUB CODE: MA

NO REF SOV: 014 OTHER: 005 ATD PRESS: 3158

Card 2/2

KRIVOGLAZ, M.A., doktor fiz.-matem. nauk; BONCH-BRUYEVICH, V.L., prof.; TYABLIKOV, S.V., red.

[Solid state physics; theory of a solid] Fizika tverdogo tela; teoriia tverdogo tela. Moskva, 1965. 235 p. (MIRA 18:9)

1. Akademiya nauk SSSR. Institut nauchnoy informatsii.

L 24918-65 EWT(1)/T/EWA(h)/EWG(k) Pz-6/Peb IJP(c) AT

ACCESSION NR: AP5003408 S/0181/65/007/001/0023/0027

AUTHORS: Bonch-Bruyevich, V. L.; Kogan, Sh. M.

TITLE: Concerning the formation of domains in semiconductors with negative differential resistance

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 23-27

TOPIC TAGS: semiconductor, domain structure, differential resistance, carrier distribution, carrier density, diffusion, recombination, semiconductor instability

ABSTRACT: The author analyzed the conditions for the stability of a spatially-homogeneous system of electrons with negative differential resistance (with an N-shaped voltage-current characteristic). It is shown in particular that the conclusion drawn by B. K. Ridley (Proc. Phys. Soc. v. 82, 954, 1963), namely that such a system is always unstable and breaks up into domains of weak and strong field,

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L 24918-65

ACCESSION NR: AP5003408

2

does not hold in all cases. In fact, when the conductivity is negative, the field produced by the space-charge fluctuations tends to increase it, but on the other hand, the processes of diffusion, recombination, and possibly also thermal conductivity lead to a suppression of the fluctuations, and the competition between the two types of processes determines whether the system is stable. The results apply also to semiconductors with mixed type of conductivity. Stability can occur if the dimensions of the system are sufficiently small. The same factors explain why the individual domains (regions of weak and strong field or regions of high and low carrier concentration) are stable. Orig. art. has: 15 formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University); Institut radiotekhniki i elektroniki, AN SSSR (Institute of Radio Engineering and Electronics, AN SSSR)

SUBMITTED: 28May64 ENCL: 00 SUB CODE: SS

NR REF SOV: 003 OTHER: 003

Card 2/2

L 43940-65 EWA(h)/EWT(1)/T Pz-6/Pab IJP(c) AT

ACCESSION NR: AP5006877 S/0181/65/007/003/0750/0758

AUTHOR: Bonch-Bruyevich, V. L.; Kalashnikov, S. G.

TITLE: On the possibility of recombination instability in semiconductors

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 750-758

TOPIC TAGS: semiconductor, recombination instability, hot electron, differential conductivity, trapping coefficient, carrier energy, self oscillation

ABSTRACT: In view of increasing interest in various types of electric instabilities in semiconductors, the authors consider some peculiarities in the recombination of hot electrons and investigate the conditions under which negative differential conductivity and recombination instability can occur in semiconductors. The conditions under which the differential conductivity of the sample becomes negative as a result of the dependence of the coefficients of trapping by impurity centers on the carrier energy are obtained. The possible occurrence of recombination instability is analyzed using as a specific example an n-type semiconductor containing trapping centers of two different types. It is shown that under cer-

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L 43940-65

ACCESSION NR: AP5006877 2

tain conditions recombination instability and electric self-oscillations, connected with periodic recombination currents between centers of different types, can occur in such a system. Orig. art. has: 43 formulas and 1 table.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova (Moscow State University); Institut radiotekhniki i elektroniki AN SSSR, Moscow (Institute of Radio Engineering and Electronics, AN SSSR)

SUBMITTED: 10Aug64 ENCL: 00 SUB CODE: NP, SS

NR REF SOV: 007 OTHER: 006

Card 2/2 pb

L 3338-66 EWT(1)/EWA(d)/EWP(k)

ACCESSION NR: AP5017312 UR/0181/65/007/007/2147/2155

AUTHOR: Bonch-Bruyevich, V. L.

TITLE: Contribution to the theory of generation-recombination noise in semiconductors

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2147-2155

TOPIC TAGS: semiconductor carrier, correlation function, Markov process, radiative recombination

ABSTRACT: The author considers the fluctuations in the number of carriers in the conduction band, due to the random character of the processes of generation and recombination of the carriers. It is shown that in general the relaxation of such fluctuations is described by an equation which does not have the same form as the Markov equation. As a result, the spectrum of the fluctuations differs from that usually assumed. In particular, in the presence of a continuous spectrum of recombination levels in a fixed frequency interval, a spectrum of the form $\omega^{-1}\ln^2(\omega/\omega_0)$ appears, where $\omega = 2\pi f$ and ω_0

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ACCESSION NR: AP5017312 6

is a characteristic constant. An equation which is not of the Markov type is obtained for the distribution function by analyzing the fluctuation correlation function. The particular case of capture of carriers by shallow discrete levels and the case when there are two bands (conduction and impurity) are considered as examples. The relation between the result and the frequently encountered 1/f type spectrum is briefly discussed. 'I am grateful to L. N. Kurbatov who called my attention to this problem.' Orig. art. has: 43 formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University) 44,55

SUBMITTED: 18Dec64 ENCL: 00 SUB CODE: SS

NR REF SOV: 005 OTHER: 002

Card 2/2 DP

ACC NR: AP5025390 SOURCE CODE: UR/0181/65/007/010/3083/3089

44,55 44,55

AUTHOR: Bonch-Bruyevich, V. L.; Drugova, A. A.

52
46
B

ORG: none

TITLE: Theory of radiative recombination at impurity centers in homopolar semiconductors

SOURCE: Fizika tverdogo tela, v. 7, no. 10, 1965, 3083-3089

TOPIC TAGS: semiconductor theory, phonon, crystal theory, radiative recombination, recombination radiation

21,44,55

ABSTRACT: The authors calculate the intensity of recombination radiation at small acceptor centers with the participation of phonons. The total intensity of impurity recombination radiation generated by transition of electrons from the conduction band to neutral acceptor levels is given by $I=\int f(\nu)\,d\nu$.

The spectral density $f(\nu)$ is given by the expression

$$f(\nu)=4\pi A\frac{h\nu^3 V N_i^{2/3}}{c^3}\mathscr{P}(\tau).$$

Here N is the total number of acceptor levels in the crystal; V is the fundamental volume; c is the velocity of light in a vacuum; ϵ is the high frequency dielectric

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2

ACC NR: AP5025390

constant of the material; τ is the wave vector of a photon with frequency ν; $\mathcal{P}(\tau)$ is the probability of radiation of this type of photon (it is shown that this probability depends only on τ^2 within the framework of the proposed model); A is a constant which depends on the conditions of radiation yield in a vacuum ($A \leq 1$; this constant is only slightly dependent on frequency ν far from lattice absorption lines). Probability $\mathcal{P}(\tau)$ is calculated. This is part of the general problem on radiative transitions with the participation of phonons. However, the electron matrix element is usually considered simply as some constant theoretical parameter. In the present case, this element is the main object of study. The investigation is limited to crystals with weak electron-phonon bonds where direct application of perturbation theory is possible. Formulas are derived within the framework of the hydrogen model for the spectral density of recombination radiation as a function of frequency and temperature. The curve for spectral density as a function of frequency shows a maximum. The position of this maximum and the half-width of the curve are determined as functions of temperature. The authors thank Ya. Ye. Pokrovskiy and K. I. Svistunova for discussing the experimental aspects of the work. Orig. art. has: 1 figure, 20 formulas.

SUB CODE: 20/ SUBM DATE: 20Feb65/ ORIG REF: 009/ OTH REF: 007

Card 2/2

L 31163-66 EWT(l)/EWT(m)/T/EWP(t)/EWA(h) IJP(c) JD/AT
ACC NR: AP6006814 SOURCE CODE: UR/0181/66/008/002/0356/0365

AUTHOR: Bonch-Bruyevich, V. L.

ORG: Institute of Radio Engineering and Electronics AN SSSR, Moscow (Institut radiotekhniki i elektroniki AN SSSR)

TITLE: Electric domains in semiconductors with hot electrons

SOURCE: Fizika tverdogo tela, v. 8, no. 2, 1966, 356-365

TOPIC TAGS: semiconductor theory, hot electron, electron gas, germanium semiconductor, electric field, Poisson equation, electric hysteresis

ABSTRACT: The author considers stationary solutions of Poisson equations and equations of continuity as applied to a model which describes an n-Ge semiconductor with copper or with gold. Although mobility and the coefficient of diffusion may theoretically be functions of the electric field strength, these relationships are not explicitly accounted for. This approximation is justified in the weak fields which are studied. The stationary nonlinear problem of distribution of charge density and electric field strength is considered where heating of the electron gas

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Card 2/2

L 2[illegible]495-66 EPF(n)-2/EWA(h)/EWT(1)/ETC(m)-6/T LIP(c) AT/WW

ACC NR: AP6009690 SOURCE CODE: UR/0181/66/008/003/0943/0947

AUTHOR: Bonch-Bruyevich, V. L.; Epshteyn, E. M.

ORG: Institute of Radio Engineering and Electroncis, AN SSSR, Moscow (Institut radiotekhniki i elektroniki AN SSSR)

TITLE: On the acoustic-recombination instability in semiconductors

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 943-947

TOPIC TAGS: ultrasonic effect, acoustoelectric effect, carrier density, semiconductor carrier, electron capture

ABSTRACT: This is a continuation of earlier work by one of the authors (Epshteyn, FTT v. 8, 552, 1966) dealing with heating of electrons by an ultrasonic beam. The present article is aimed at determining the influence of charged impurity centers on the dependence of the acousto-electric current on the magnitude of the sound flux. The acousto-electric coefficient is calculated first with allowance for the fact that a change in the sound flux changes also the electron temperature and the carrier density. The conditions under which the differential acousto-electric coefficient becomes negative are determined. It is found that for n-Ge at 10K and a sound wave vector 6×10^5 cm^{-1} the flux density needed for this purpose must exceed 0.1 w/cm^2. The dependence of the capture coefficients on the carrier energy is shown to be such that the plot of the acousto-electric current against the sound flux can have a decreasing section, thus leading to instability of the system against fluctuations of

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L 25495-66

ACC NR: AP6009690

the sound flux and of the electron density. Capture both by like and unlike charge centers is considered. It is shown that the instability can occur in both cases. The authors thank S. G. Kalshnikov for a discussion of the work. Orig. art. has: 18 formulas.

SUB CODE: 20/ SUBM DATE: 03Jul65/ ORIG REF: 006/ OTH REF: 004

Card 2/2 dc

L 41731-66 EWT(1)/T IJP(c) AT

ACC NR: AP6018536 SOURCE CODE: UR/0181/66/008/006/1753/1760

AUTHOR: Bonch-Bruyevich, V. L.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: On the motion of electric domains in semiconductors with hot electrons

SOURCE: Fizika tverdogo tela, v. 8, no. 6, 1966, 1753-1760

TOPIC TAGS: semiconductor carrier, electron temperature, semiconductor plasma, plasma wave, plasma oscillation, electric domain boundary

ABSTRACT: Since it has been demonstrated by many investigators that when the carriers in a semiconductor are heated to a sufficiently high temperature the homogeneous charge and field distributions become unstable and a domain structure can be produced, the author examines the one-dimensional nonlinear problem of the field of charge density distribution in a semiconductor with hot electrons. The samples are assumed to be spatially homogeneous in the absence of an external field. Simultaneous solution of the continuity, Poisson, and recombination-kinetics equations, with boundary conditions that take into account the neutrality of the sample and the energy balance condition, shows that under certain conditions stationary waves of space charge and of field propagate in the semiconductor. This leads to oscillations of the same type as are experimentally observed during domain motion. The period of oscillation is connected with the length of the sample and with the phase velocity

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ACC NR: AP6018536

of the wave. A tentative formula is derived for the domain velocity. The validity of some of the approximations made in the calculations is briefly discussed. The author thanks V. S. Vavilov, M. Vrana, N. G. Zhdanova, M. S. Kagan, S. G. Kalashnikov, and I. A. Kurova for supplying their experimental results prior to publication. Orig. art. has: 25 formulas.

SUB CODE: 20/ SUBM DATE: 02Nov65/ ORIG REF: 007/ OTH REF: 013

Card 2/2 mjf

L 00865-67 T/EWP(e)/EIT 101(e) SD/...

ACC NR: AP6024347 SOURCE CODE: GE/0030/66/016/001/0197/0203

62
B

AUTHOR: Kalashnikov, S. G.; Bonch-Bruevich, V. L.

ORG: Institute of Radio Engineering and Electronics, Academy of Sciences of the USSR, Moscow

TITLE: On the velocity of space charge waves (electrical domains) in semiconductors

21

SOURCE: Physica status solidi, v. 16, no. 1, 1966, 197-203

TOPIC TAGS: semiconductor theory, space charge

ABSTRACT: The nonlinear problem of the velocity of space charge waves (electrical domains) which occur when the volume differential resistance becomes negative is studied. Particular attention is paid to the recombination (concentration-controlled) type of instability. A simple explicit formula is obtained for the velocity of stationary space charge waves. The domain velocity is derived for cases in which the Maxwellian relaxation time is much longer or much shorter than the recombination time. In order of magnitude, the results obtained are in agreement with experimental data on domains in Au- and Cu-doped Ge. Authors thank M. S. Kagan for informing them of his experimental results concerning the domains in Cu-doped Ge and for discussing the manuscript. They also thank Yu. F. Sokolov for discussing the manuscript. Orig. art. has: 1 figure and 22 formulas.

SUB CODE: 20/ SUBM DATE: 18Apr66/ ORIG REF: 009/ OTH REF: 014

Card 1/1 LS

Dissertation: "Operative Treatment of Fractures of the Knee." Cand Med Sci, First Moscow Order of Lenin Medical Inst, 7 Jun 54. Vechernyaya Moskva, Moscow, 23 May 54.

SO: SUM 284, 26 Nov 1954

BONCH-BRUYEVICH, Ye. V., kand. med. nauk

Late results of fractures of the patella following its partial or total removal. Khirurgiia 38 no.5:95-100 My '62. (MIRA 15:6)

1. Iz Moskovskogo gorodskogo nauchno-issledovatel'skogo instituta skoroy pomoshchi imeni N. V. Sklifosovskogo (dir. - zasluzhennyy vrach UkrSSR M. M. Tarasov, glavnyy khirurg - zasluzhennyy deyatel' nauki prof. B. A. Petrov)

(PATELLA--FRACTURE)

Bonch-Bruevich, V.E. V.-- Moscow

"Skin Transplation in Extensive Burns."

report submitted for the 27th Congress of Surgeons of the USSR, Moscow, 23-28 May 1960.

SPIRO, N.S.; BONCH-OSMOLOVSKAYA, K.S.

Composition of absorbed clay complexes in cases of equilibrium with solutions such as sea water; experimental studies. Trudy Nauch.-issl. inst.geol.Arkt. 86:113-133 '56. (MLRA 10:3)
(Sea water--Analysis) (Clay)

BONCH-OSMOLOVSKAYA, K.S.; SPIRO, N.S.

Method for obtaining extracts from argillaceous sedimentary rocks for studying compositions of readily soluble salts and the absorbed cation complex. Trudy Nauch.-issl.inst.geol.Arkt. 86:133-160 '56. (MLRA 10:3)

(Rocks, Sedimentary--Analysis)

SPIRO, N.S.; BONCH-OSMOLOVSKAYA, K.S.

Composition of adsorbed clay bases in the case of equilibrium with different types of waters. Trudy NIIGA 98:36-62 '59. (MIRA 13:5)

(Clay--Analysis) (Water--Analysis)

BONCH-OSMOLOVSKAYA, K.S.

Measuring small strontium quantities in the presence of large calcium quantities using a flame photometer with a photoresistor. Uch. zap. NIIGA. Reg. geol. no.4:252-260 '64. (MIRA 18:12)

BONCH-OSMOLOVSKAYA, K.S.

Strontium content of calcium carbonates depending on conditions governing the formation of the solid phase. Uch. zap. NIIGA. Reg. geol. no.2:157-178 '64.

Strontium content of calcium sulfates depending on conditions governing the formation of the solid phase. Ibid.:179-187
(MIRA 19:1)

21(1), (8) PHASE I BOOK EXPLOITATION SOV/3051

Bonch-Osmolovskaya, Natal'ya Aleksandrovna

Atomnyy fotoeffekt v oblasti γ-luchey (Atomic Photoelectric Effect in the Gamma-ray Range) Moscow, AN SSSR, 1959. 48 p. Errata slip inserted. 950 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Biblioteka.

Ed.: B. S. Dzhelepov, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: Ye. A. Semenova; Tech. Ed.: V. T. Bochever.

PURPOSE: This book is intended for both nuclear and theoretical physicists.

COVERAGE: The book presents analyses of formulas and methods for computing the angular distribution of photoelectrons for any hν(quantum of energy) and z (atomic number). Also, for the case where the binding energy Ik of a K-shell electron is greater than the quantum of energy hν of an incident photon but less than 1 Mev, formulas limited to cases of large z are given. The final supplementary section contains tabulated data on the effective cross-section of photoelectric effect in barns for twenty-two elements for hν

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from 100 Kev to 200 Mev. No personalities are mentioned. There are 42 references: 6 Soviet, 26 English, and 10 German.

TABLE OF CONTENTS:

Introduction 3

1. Photoelectric Effect in the K-shell 5

2. Photoelectric Effect in the L- and M-shells 12

3. Angular Distribution of Photoelectrons 24

4. Angular Distribution of Photoelectrons Knocked Out by Polarized Gamma-Radiation 35

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AVAILABLE: Library of Congress (QC715.B6)

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B006/B014

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AUTHORS: Bonch-Osmolovskaya, N. A., Dzhelepov, B. S., Kraft, O. Ye.

TITLE: Study of Positron Spectra of Neutron-deficient Isotopes 79 79

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 3, pp. 283-287

TEXT: The article under review was read at the Tenth All-Union Conference on Nuclear Spectroscopy (Moscow, January 19 - 27, 1960). The authors studied the positron spectra of some neutron-deficient isotopes obtained by bombarding a tantalum target with 680-Mev protons. The authors used a β-spectrometer with triple beam focusing. Results are given according to elements. Lutetium: The hardest component recorded had an energy limit of about 2,800 kev. All spectral regions with an energy exceeding 1,500 kev corresponded to one and the same half-life of 85±18 min (Fig. 1). Thus, it may be seen from the Curie curve shown in Fig. 2 that the energy limit of the β^+-spectrum was 2,800±200 kev, corresponding to a half-life of 56±12 min. The above component can, therefore, be ascribed to Lu^{167}

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(55 min). The Curie curve of this isotope is shown in Fig. 3. The problem of the β^+-spectrum with the energy limit of 2,800 kev and T = 85 min has not yet been solved. Such an isotope is unknown. Two explanations are possible: 1) Such an Lu isotope as, e.g., Lu^{168} actually exists. In this case also a γ-radiation would have to exist for this half-life, which has not yet been observed. 2) It is the radiation of the 75-minute Yb isotope (β^+-energy limit 2.95 Mev); the presence of such an impurity is not impossible. Thulium: The authors recorded a β^+-spectrum with an energy limit of 2.1 Mev (7.3 hours - Tu^{166}) and one with 137 min (Tu^{163}). As shown in Fig. 4, the spectrum consists of two components with the energy limits 1,050±80 and 400±50 kev with an intensity ratio of 1 : 0.7. The Tu^{163} - Er^{163} mass difference was ≅2,070 kev. Other authors found 2.1 and 2.24 Mev. Erbium: Intense positron emission with an energy limit of 1,300 kev (~2.5 hours) was found, further one with 115±15 min. This spectrum also consisted of two components with the energy limits 1,900±100 and 2,980±100 kev, and an intensity ratio of 5 : 1. Also the electron-conversion line with 900 kev (2 hours), which was observed for the first time by I. A. Dneprovskiy, was detected. Dysprosium: The

4

Study of Positron Spectra of Neutron-deficient Isotopes

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dysprosium spectrum also consisted of two components with the energy limits 2,700±100 and 1,650±100 kev, and an intensity ratio of 3 : 1. Two possibilities concerning the origin of these components are discussed. There are some facts which contradict the existence of a decay series $Dy^{154} \xrightarrow{3hs} Tb^{154} \xrightarrow{18hs} Gd^{154}$, but speak in favor of $Dy^{152} \xrightarrow{3hs} Tb^{152} \xrightarrow{18hs} Gd^{152}$. Besides, the authors also detected a β^+-spectrum with an energy limit of about 900 kev (10 hs - presumably Dy^{155}). A. S. Basina, I. A. Yutlandov and V. M. Khalkin for carrying out the chemical work, as well as K. Ya. Gromov and L. K. Peker for their discussions. There are 5 figures and 17 references, 8 of which are Soviet.

Card 3/3

BONCH-OSMOLOVSKAYA, N.A.; DZHELEPOV, B.S.; KRAFT, O.Ye.; CHZHOU YUYE-VA [Chou Yüeh-wa]

Positron spectra of the neutron-deficient isotopes of terbium and neodymium. Izv. AN SSSR. Ser. fiz. 25 no.7:826-831 Jl '61. (MIRA 14:7)

(Terbium--Spectra) (Neodymium--Spectra) (Positrons)

40091
S/048/62/026/008/001/028
B141/B108

26.2541

AUTHORS: Bonch-Osmolovskaya, N. A., Gromov, K. Ya., Dzhelepov, B. S., Kraft, O. Ye., Malysheva, T. V., Nikityuk, L. N., Khotin, B. A., Chou Yüch-wa, and Chumin, V. G.

TITLE: The predicted isomer Ir^{186}

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 8, 1962, 975-976

TEXT: Positrons with an intensity decrease of $T_{1/2} \sim 2$ hrs were discovered in a spectrometric investigation of an iridium fraction obtained from a gold target irradiated by 660-Mev protons. The positron spectrum consisted of five components (end-point energies 3400, 2600, 1930, 1300, ~800 kev; relative intensities 1, 20, 44, 12, 22). The conversion electron spectrum of the same Ir fraction had two lines (M 137, N 137). The I(t) of these lines curve could not be attributed to a single halflife. M 137 consists of two components, one with $T_{1/2} = 15 \pm 1$ hrs and one with 1.7 ± 0.2 (Ir^{186}) which is, within the limits of error, equal to the

Card 1/2

BONCH-OSMOLOVSKIY, A.G.; FEDOROV, V.L.

Theory of induction ammeters for high frequencies. Izm. tekh. no.4: 79-83 Jl-Ag '57. (MLRA 10:8)

(Ammeter)

BONCH-OSMOLOVSKIY, A. G. Cand Tech Sci -- (diss) "Obtaining of periodic impulse magnetic fields of high tension and their utilization for the formation of electronic currents." Len, 1959. 15 pp (Min of Higher Education USSR. Len Electrical Engineering Inst im V. I. Ul'yanov(Lenin)), 150 copies (KL, 47-59, 114)

06527

9(3,9), 8(6,7) SOV/142-2-2-3/25

AUTHORS: Bonch-Osmolovskiy, A.G., and Krylov, K.I.

TITLE: Generation of High-intensity Periodically Pulsed Magnetic Fields

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, 1959, Vol 2, Nr 2, pp 155-164 (USSR)

ABSTRACT: The authors present in their paper a review of the works of 11 foreign authors concerning the production of strong magnetic fields. Then, they describe an experimental unit which was developed by them. The block diagram of this unit is shown in figure 1, while figure 2 represents the circuit diagram. Figure 3 is a photograph of the entire unit. The authors describe the results of experiments for producing strong pulsed magnetic fields with different pulse sequence frequencies. Using a special exitron commutation circuit and coils developed by the authors, magnetic fields were obtained up to an intensity of 20,000 oersted in volumes of 50 cm^3 at a pulse sequence frequency of 50 cycles. They obtained magnetic fields up to 450,000 oersted in volumes of 0.1 cm^3 at a pulse

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Generation of High-intensity Periodically Pulsed Magnetic Fields

sequence frequency of 3 cycles. The maximum discharge energy did not exceed 300 joule. The authors present formulae for calculating the strength of the magnetic field of the coil and the measuring of the magnetic field. The coils used for producing the strong magnetic fields were of the same type as described by other authors [Ref 8,9,12], single-layer coils having a high mechanical strength. For better cooling of the coils and reducing their resistance, they were placed in liquid nitrogen. The coils worked also satisfactorily with air or water cooling, but the magnetic field strength was then 10-15% lower. The efficiency of the experimental unit was 60% with nitrogen cooling. There are 2 photographs, 1 block diagram, 1 circuit diagram, 2 tables and 13 references, 2 of which are Soviet, 1 French and 10 English.

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SOV/142-2-2-3/25

Generation of High-intensity Periodically Pulsed Magnetic Fields

This article was recommended by the Kafedra radiotekhnicheskoy elektroniki Leningradskogo elektrotekhnicheskogo instituta imeni V.I. Ul'yanova (Lenin) (Chair of Radio Engineering Electronics of the Leningrad Electrical Engineering Institute imeni V.I. Ul'yanov (Lenin))

SUBMITTED: November 21, 1958

Card 3/3

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24.2300

AUTHORS: Bonch-Osmolovskiy, A.G., and Ivanov, G.K.

TITLE: Circuits for obtaining high-intensity, approximately rectangular, pulsed magnetic fields

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, 1960, Vol.3, No.6, pp. 558-562

TEXT: This article describes a method and the apparatus for producing pulsed magnetic fields having intensities up to 10^5 oe and durations up to 200 microseconds. The pulse shape is approximately rectangular with the first portion (H constant to an accuracy of ± 1.5%) for 35% of the total time of the pulse. A pulsed magnetic field may be produced by connecting the field producing coil L_0 in the last section of an artificial line (immediately before the matching load resistance) and discharging the line. For coil currents of the order of 10^4 amps, the values of the wave impedance of the line (ρ) and of the initial voltage to which the line is charged are of the order of 0.2 Ohms and 2000 V respectively. For this method, the minimum number of line sections n is 8 – 10. A simpler and more efficient equivalent circuit is

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shown in Fig.2. The complete circuit of the equipment, including the charging and switching circuit which uses a single mercury excitron, is described. The experimental results are given. With a pulse repetition frequency of 12.5 - 50 c/s magnetic fields up to 20 000 oe were obtained.

Acknowledgments are expressed to Professor K.I. Krylov who advised in this work and to V.A. Skorobogatov who assisted with the experiments.

There are 4 figures and 6 references: 3 Soviet and 3 non-Soviet. The two English language references read as follows:

Ref.1: H. Furth, M. Levine, R. Waniek. Production and use of high transient magnetic fields. II. Rev. Sci. Instr., 1957, 28, 949.

Ref.4: S. Foner and H. Kolm. Coil for pulsed megagauss fields Rev. Sci. Instr., 1956, V 27, No.5 317.

ASSOCIATION: Kafedra spetsfiziki Leningradskogo elektrotekhnicheskogo instituta im. V.I. Ul'yanova (Lenina)
(Department of Special Physics, Leningrad Institute of Electrical Engineering imeni V.I. Ul'yanov (Lenin))

S/142/61/004/001/003/008
E140/E163

9,2580 (1159)

AUTHORS: Bonch-Osmolovskiy, A.G., and Khodnevich, A.D.

TITLE: Generator of magnetic field pulses with high pulse repetition rate

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, 1961, Vol.4, No.1, pp. 49-54

TEXT: Previous literature known to the authors describes magnetic field pulse generators for single impulses or repetition rates of 50 or 100 cps. For focusing pulsed electron streams, and other applications, it would be of advantage to have periodic fields with frequencies of the order of hundreds or thousands of cps. The authors describe a vacuum tube circuit for generating periodic bipolar current pulses of the order of several hundred A and duration ~10 μsec and frequencies up to 1300 cps. The tubes used are hydrogen thyratrons, with the frequency controlled by an external generator. The magnetic field is generated by a coil tuned to resonance by a series capacitor. The fields obtained ranged from 10500 Oe at 50 cps to 3100 Oe at 1300 cps.

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E140/E163

Generator of magnetic field pulses...

There are 7 figures, 2 tables and 4 references: 2 Soviet, 1 French and 1 English. The English language reference reads:
Ref.2: K.S.W. Champion. The Production of Pulsed Magnetic Fields Using Condenser Energy Storage. Proc. Phys. Soc., 1950, 63, 795.

ASSOCIATION: Kafedra spetsfiziki Leningradskogo elektrotekhnicheskogo instituta im. V.I. Ul'yanova (Lenina)
(Department for Special Physics of the Leningrad Electrical Engineering Institute imeni V.I. Ul'yanov (Lenin)

SUBMITTED: June 4, 1960

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ACC NR: AP5025885 SOURCE CODE: UR/0057/65/035/010/1757/1761

AUTHOR: Bonch-Osmolovskiy, A.G. 44,55

ORG: none 63 B

TITLE: On the motion of a charged particle in the field of a retarded plane electromagnetic wave

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 10, 1965, 1757-1761

TOPIC TAGS: linear accelerator, electromagnetic wave, charged particle, relativistic particle, particle acceleration, laser application 21,44,55

ABSTRACT: The author discusses the acceleration of an electron in a longitudinal magnetic field by a plane electromagnetic wave propagating in a medium whose refractive index varies in such a way that the phase velocity of the wave remains everywhere equal to the velocity of the electron. The refractive index gradient is assumed to be small compared with the reciprocal wavelength. It is shown that under these conditions the electron will not be accelerated by the field of a plane or circularly polarized wave but that acceleration would occur in a quasi-azimuthally polarized field. It is suggested that a field of the requisite type might be achieved with the aid of a number of suitably polarized laser beams propagating along generators of the cylinder on which the electron executes its helical motion in the longitudinal magnetic field.

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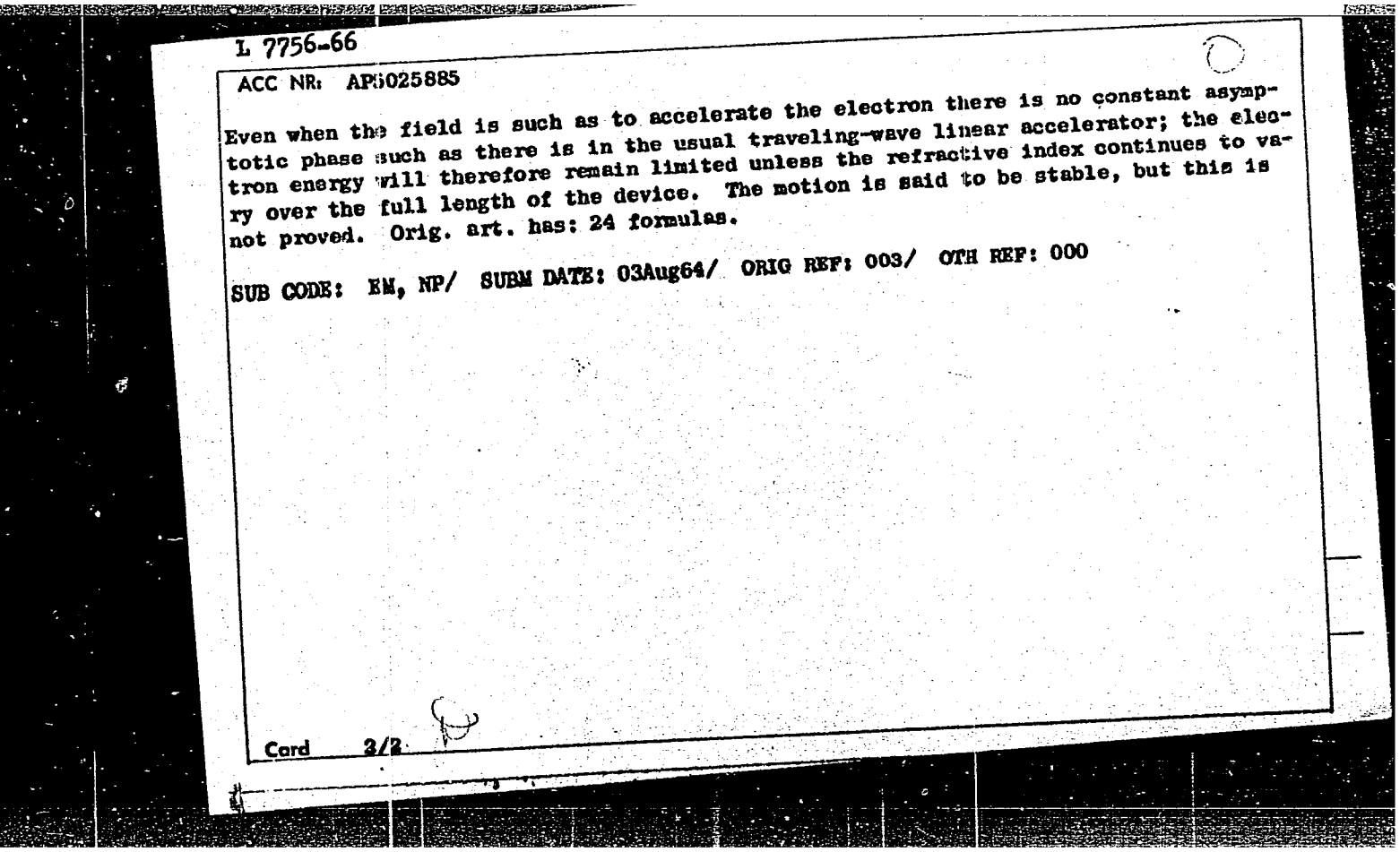

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ACC NR: AP5025885

Even when the field is such as to accelerate the electron there is no constant asymptotic phase such as there is in the usual traveling-wave linear accelerator; the electron energy will therefore remain limited unless the refractive index continues to vary over the full length of the device. The motion is said to be stable, but this is not proved. Orig. art. has: 24 formulas.

SUB CODE: EM, NP/ SUBM DATE: 03Aug64/ ORIG REF: 003/ OTH REF: 000

Card 3/3

BONCH-OSMOLOVSKY, G. A.

G. A. Bonch-Osmolovsky: "Evolutionary significance of the appostion of the thumb (pollex) of the wrist." (p. 2)

SO: Journal of General Biology Vol. 5, No. 1, 1944

BONCH-OSMOLOVSKY, Glieb Anatolievich

"Glieb Anatolievich Bonch-Osmolovsky as Biologist." by Kryshova, N. A. (p. 1)

SO: Journal of General Biology, Vol. 6, No. 1, 1944

BONCH-OSMOLOVSKIY, Gleb Anatol'yevich; BUNAK, V.V., redaktor; MEDVEDEVA, M.V., redaktor; SUVOROVA, L.D., tekhnicheskiy redaktor.

[The paleolithic period in Crimea] Paleolit Kryma. No.3. [Skeleton of the foot and leg of a prehistoric man from the Kiik-Koba cave] Skelet stopy i goleni iskopaemogo cheloveka iz grota Kiik-Koba. Red. i dopolneniia V.V.Bunaka. Moskva, Izd-vo Akademii nauk SSSR. 1954. 397 p. (MLRA 8:1)
(Crimea--Man, Prehistoric)

BONCH-OSMOLOVSKIY, M.A., inzhener-mekhanik.

Selection of parameters of the interweaving mechanism of one type of braiding machine. Trudy MEI no.17:173-179 '55. (MLRA 9:7)

1.Kafedra teorii mekhanizmov i detaley mashin.
(Electric cables) (Machinery--Design)

BONCH-OSMOLOVSKIY, M. A.

BONCH-OSMOLOVSKIY, M. A.: "Principles of the theory and methods of calculations for wire-covering machines". Moscow, 1955. Min Higher Education USSR. Moscow Orderoof Lenin Power Engineering Inst imeni V. M. Molotov. (Dissertations for the Degree of Candidate of Technical Sciences)

SO: Knizhnaya letopis', No. 52, 24 December, 1955. Moscow.

Bonch-Osmolovskiy, M.A.

ITSKOVICH, G.M.; KISELEV, V.A.; CHERNAVSKIY, S.A.; BOKOV, K.N.; FAGEL', A.Z., BONCH-OSMOLOVSKIY, M.A.; GRINCHAR, G.N.; CHERNAVSKIY, S.A., kandidat tekhnicheskikh nauk, nauchnyy redaktor; TIKHONOV, A.Ya., tekhnicheskiy redaktor

[Collection of problems and methods of calculating machine parts] Sbornik zadach i primerov rascheta detalei mashin. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1957. 267 p. (MIRA 10:4)
(Machinery--Design)

110-58-5-21/25

AUTHORS: Boach-Osmolovskiy, M.A., Candidate of Technical Sciences and Babitskiy, O.Sh., Engineer

TITLE: Efficient Selection of Braiding Equipment (Ratsional'nyy vybor opletochnogo oborudovaniya)

PERIODICAL: Vestnik Elektropromyshlennosti, 1958, Vol 29, Nr 5, pp 62 -67 (USSR)

ABSTRACT: This article compares braiding machines in respect of their method of operation and their running costs. Braiding machines are classified into three main types: spindle machines, roundabout machines and knitting machines. The principles of the different machines are explained and Soviet and foreign types of each are named. The data on knitting machines are taken from foreign sources. Two main factors that govern the quality of braiding are constancy of thread tension and the dynamic factor. This latter is the product of the mass of those parts of the machine which move non-uniformly and their acceleration. The characteristics of the different types of the machines in respect of these two characteristics are discussed. Figures for the angular velocity of braiding machines are given in Table 1. A tech-

Cardl/2 nical and economic analysis is then made of the main types of

The Efficient Selection of Braiding Equipment

machine and Table 2 gives the results of an analysis of production costs. It is concluded that compared with spindle machines roundabout machines are better, and show a cost of production of about a third. Contrary to the usual opinion, repair costs of spindle machines are very high. Knitting machines are then described and their principles of operation explained with reference to Figures 3 and 4. Knitting machines are apparently widely used abroad in various forms which are described. The advantages of knitting machines are summarised and it is concluded that they should be introduced into Soviet factories. Finally, the recommendations about selection of different types of machines for different kinds of work are recapitulated.
There are 6 figures, 2 tables and 3 references, 1 of which is Soviet and 2 English.

ASSOCIATIONS: MEI and NIIKP

SUBMITTED: April 23, 1957

Card 2/2

ITSKOVICH, G.M.; KISELEV, V.A.; CHERNAVSKIY, S.A., kand.tekhn.nauk; BOKOV, K.N.; FAGEL', A.Z.; BONCH-OSMOLOVSKIY, M.A.; GRINCHAR, G.N.; EL'KIND, V.D., tekhn.red.

[Collected problems and exercises of design for the course on machine parts] Sbornik zadach i primerov rascheta po kursu detalei mashin. Izd.2-e, perer. Moskva, Gos.nauchno-tekhn. izd-vo mashinostroit.lit-ry, 1959. 330 p. (MIRA 13:10)
(Mechanical engineering--Problems, exercises, etc.)

PHASE I BOOK EXPLOITATION SOV/3453

Chernavskiy, Sergey Aleksandrovich, Georgiy Mikhaylovich Itskovich, Vyacheslav Aleksandrovich Kiselev, Kirill Nikolayevich Bokov, Mikhail Aleksandrovich Bonch-Osmolovskiy, and Boris Pavlovich Kozintsov

Proyektirovaniye mekhanicheskikh peredach; uchebno-spravochnoye posobiye po kursovomu proyektirovaniyu detaley mashin (Designing of Mechanical Drives; Text and Handbook On Machine Parts Designing) Moscow, Mashgiz, 1959. 740 p. 80,000 copies printed.

Scientific Ed.: S.A. Chernavskiy; Ed. of Publishing House: N.Yu. Blagosklonova, Engineer; Tech. Ed.: A.Ya. Tikhanov; Managing Ed. for Information Literature: I.M. Monastyrskiy, Engineer.

PURPOSE: This manual is intended for students in higher engineering schools.

COVERAGE: This book describes the basic principles of the kinematic design of drives with a consideration of economy

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factors. Fundamentals of designing speed reducers, variable speed drives, and various types of mechanical transmission are explained. Methods of designing for strength are also discussed. Examples of design and construction of drives are presented. No personalities are mentioned. There are 67 Soviet references.

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1. The scope and content of the assignments 5
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Ch. II. Making Drawings and Calculation Notes 33
3. Basic requirements for preparation of drawings (K.N. Bokov) 33
4. Preparation and the form of calculation notes (G.M. Itskovich, Engineer) 39

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CHERNAVSKIY, S.A., kand. tekhn.nauk; ITSKOVICH, G.M.; KISELEV, V.A.; BOKOV, K.N.; BONCH-OSMOLOVSKIY, M.A.; KOZINTSOV, V.P.; [illegible] va; SOKOLOVA, T.F., tekhn. red.

[Design of mechanical transmissions] Proektirovanie mekhanicheskikh peredach; uchebno-spravochnoe posobie po kursovomu proektirovaniiu mekhanicheskikh peredach. Izd.2., perer. [By] S.A.Chernavskii i dr. Moskva, Mashgiz, 1963. 799 p. (MIRA 16:12)

(Power transmissions)

BONCH-OSMOLOVSKAYA, N.A.; GROMOV, K.Ya.; DZHELEPOV, B.S.; KRAFT, O.Ye.; MALYSHEVA, T.V.; NIKITYUK, L.N.; KHOTIN, B.A.; CHZHOU YUYE-VA [Chou Yüeh-wa]; CHUMIN, V.G.

On the supposed isomer Ir^{186}. Izv. AN SSSR. Ser. fiz. 26 no.8:975-976 Ag '62. (MIRA 15:11)

(Iridium--Isotopes)

KOSTYUCHENOK, B.M. (Leningrad); BONCH-OSMOLOVSKIY, Ye.Ye., vedushchiy khirurg.

Case of removing a needle from the myocardium. Vest.khir. 73 no.3:57 My-Je '53. (MLRA 6:6)

1. Khirurgicheskoye otdeleniye Minskogo gospitalya.
(Heart--Foreign bodies)

BONCH-OSMOLOVSKIY, Ye.Ye

Perforating heart wound. Vest.khir.75 no.6:115-116 Jl '55.
(MLRA 8:10)

1. Iz Demidovskoy bol'nitsy (gl.vrach--Ye.Ye. Bonch-Osmolovskiy) Smolenskoy oblasti, Minsk, Okruzhnoy voyennyy gospital'.
(HEART--WOUNDS AND INJURIES)